

39 Equivalent ratios

We are learning to solve simple ratio problems by repeated copying.



Beans, counters, cubes.

NUMBER KNOWLEDGE

Numeracy Book 4

Number Mats and

Number Fans

Fraction Pieces

Bowl a Fact

In this book

Twos, threes, fives and tens in numbers to 100page 233

Multiplication and division basic factspage 234

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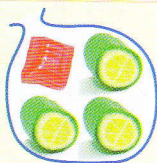
Activity

1 This example has been started for you.

Example

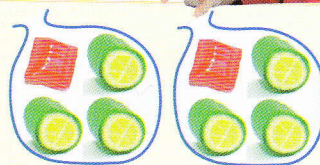
Tepi is making sweet bags for a fair. He puts one red sweet and three green sweets in each bag. How many red and how many green sweets would he need to make nine bags?

1 bag has



1 red and 3 green

2 bags have



2 red and 6 green

A table can be used to help find the answer.

Bags	1	2	3	4	5	6	7	8	9
Red sweets	1	2	3	4	?	?	?	?	?
Green sweets	3	6	9	12	?	?	?	?	?

Or, a double number line can be used to help find the answer.



In 9 bags there would be ? red sweets and ? green sweets.

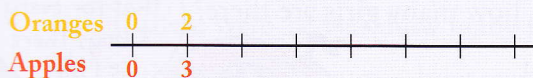
Notice the patterns in the numbers in the table and double number line.

- What patterns might Millee have noticed in the table and on the number line that would help her fill in the missing numbers?
- What is the relationship between the number of bags and
 - the number of red sweets?
 - the number of green sweets?
- What are the missing numbers in the answer?

- 2 Neve is making bowls of fruit to put in hotel rooms. In each bowl she puts two oranges and three apples.

a How many oranges and how many apples would there be in two bowls?

b Neve drew this double number line and table.



Number of bowls	1	2	3	4	5	6	7
Oranges	2						
Apples	3						



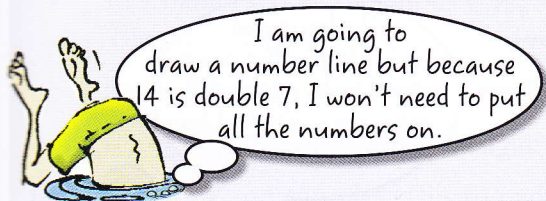
You could use counters or beans for the oranges and apples if you need to.

Copy and finish Neve's double number line and table.



c Discuss with a classmate whether you think the table or the number line is the easier way to record your thinking.

d Neve wants to know how many of each fruit she would need for 14 fruit bowls.



i Explain what Sam means.

ii Draw a double number line or table to help you find the answer.

- 3 Liam is making up bags of coloured dice for a game. Each bag has one red die and four blue dice.

Draw a double number line or a table to help you work out how many dice of each colour are needed for these numbers of bags.

a 6 bags b 8 bags c 10 bags d 12 bags e 16 bags



4 Special today only
Bag of rolls

Each bag has two white rolls and three brown rolls in it. How many white rolls would be needed to make up bags if there were 12 brown rolls available?

- 5 Challenge Marbles are packed and sold in bags of five.

Stand A is made up of bags with two yellow marbles and three purple marbles in each.



Stand B is made up of bags with three yellow marbles and two purple marbles in each.



What is the smallest number of each different bag of marbles you would have to have to get

- a the same number of yellow marbles on both Stand A and Stand B?
- b the same number of purple marbles on Stand A and Stand B?



If there are 2 green dice and 1 red die in every bag, we can write this as:

The ratio of green dice to red dice is 2 : 1.

The ratio of red dice to green dice is 1 : 2.

This is how a ratio is written.
The order of the numbers matters.



Example

The ratio of boys to girls in a football club is 3 : 1.

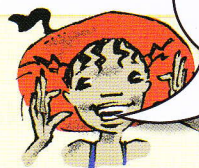
If there are 15 boys in the club, how many girls are there?

For every 3 boys in the club there is 1 girl.

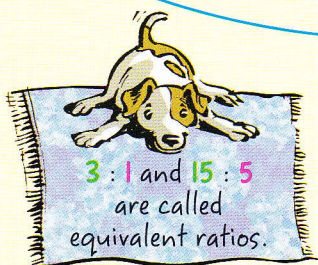
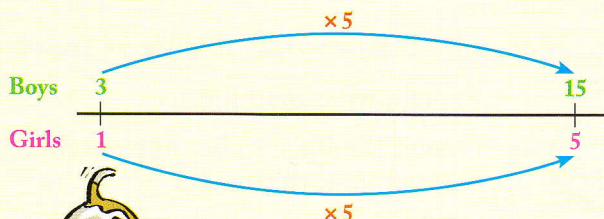
$15 = 5 \times 3$.

There are 5 groups of 3 boys in the club.

There must be 5 groups of 1 girl in the club.



This means
that for every
3 boys there
is 1 girl.



$$\begin{array}{c} \times 5 \\ \curvearrowright \\ 3 : 1 = 15 : 5 \\ \curvearrowleft \\ \times 5 \end{array}$$

The boys and
girls stay in the same
ratio if both parts of the
ratio are multiplied by
the same number.



There are 5 girls in the club.



- 6 Read the example above.
Explain to a classmate why 3 : 1 and 15 : 5 are equivalent ratios.

- 7 Hine makes fruit pies for a bakery.

- a How many plums would there be in ten fruit pies?
b How many of each fruit would there be in these
numbers of fruit pies?

i 20 ii 30 iii 40 iv 12 v 24 vi 15

- c What do you notice about the relationship between the number of
plums and the number of nectarines for each of your answers to **part b**?
d Hine used eight nectarines to make pies.
How many plums did she use in these pies?
e Hine bought a bag of 15 plums to put in some pies.
How many nectarines will she need to buy to go with the plums?


Fruit pie recipe

- 3 plums
- 2 nectarines
- 1 cup sugar



Record your thinking for questions 8 to 10.

- 8 The ratio of vets to nurses at an animal shelter is always 3 : 5.

-  a Explain to a classmate what the ratio 3 : 5 means.
 b If there were 3 vets, how many nurses would there be?
 c If there were 12 vets, how many nurses would there be?
 d If there were 25 nurses, how many vets would there be?
 e Copy this and fill in the missing numbers to make equivalent ratios.

$$3 : 5 = 6 : \boxed{?} = 9 : \boxed{?} = \boxed{?} : 20$$



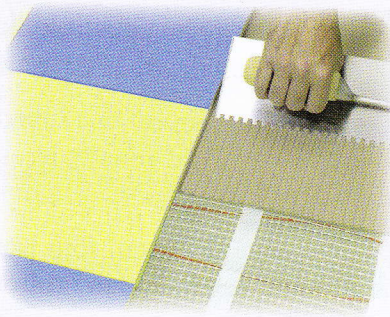
- 9 In Zhang's school the pupils voted on whether they wanted to wear school uniform. The ratio of votes for uniform to votes against uniform was 3 : 4.

- a In Zhang's class, 9 pupils voted for uniform. How many voted against?
 b In Taylor's class, 16 voted against uniform. How many voted for?
 c Copy and complete this to make equivalent ratios.

$$3 : 4 = \boxed{?} : 8 = 9 : \boxed{?} = \boxed{?} : 16 = 15 : \boxed{?} = \boxed{?} : 24$$

- 10 Mrs Harris is having her bathroom tiled. For every three blue tiles there are four yellow tiles.

- a What is the ratio of blue tiles to yellow tiles?
 b On one wall, the tiler used 150 blue tiles. How many yellow tiles did he use?
 c On another wall, the tiler used 120 yellow tiles. How many blue tiles did he use?
 d How many blue and how many yellow tiles did he put on the two walls in **parts b and c**? Write this as a ratio of blue tiles to yellow tiles. Is this ratio equivalent to the one you wrote down in **part a**? Explain.



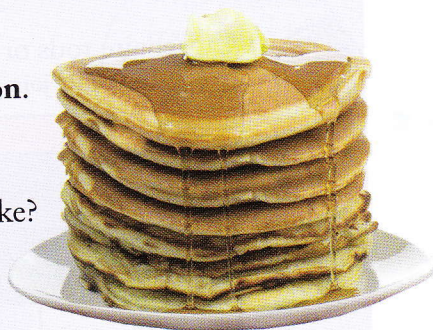
11 Challenge

- a Of every five TV programmes that Sasha watches, three are comedies. What is the ratio of comedy programmes to non-comedy programmes that Sasha watches?
 b Work out the ratio of comedy to non-comedy programmes you watch.



- 2 Beau took four energy bars to share with his hockey team.
Each person was to have a quarter of an energy bar at half time.
- a To how many people can he give a quarter of an energy bar?
Draw an array diagram or double number line to show how you could use multiplication to find the answer.
- b Record your answer using an equation.
What is the answer referring to?

For questions 3 to 5, record your answer using an equation.
Explain what the answer is referring to each time.



- 3 Lizzie has eight pancakes.
How many people could each have a tenth of a pancake?
- 4 Filippo cut seven coconuts into eighths.
How many pieces of coconut did he have?
- 5 Bethan cut some coloured fabric squares to make cushions.
How many squares will Bethan have if she cuts
- a 6 red squares into sixths? b 5 blue squares into tenths?
c 7 orange squares into quarters? d 8 green squares into fifths?



6 a If I divide three pizzas into 12 pieces each piece is a quarter.
If I divide three pizzas into quarters I get 12 pieces.
So if $3 \div 12 = 1$ quarter then $3 \div \frac{1}{4} = 12$.

Is Sam correct?
Explain why or why not.



- b What fraction do you get if you divide two pizzas into six pieces?
How could you use your answer to this to find the answer to $2 \div \frac{1}{3}$?



7 Challenge

- a Huang bought six pizzas for tea.
He wanted to give everyone $\frac{3}{4}$ of a pizza.
How might Huang finish his reasoning to find the answer?
- b Erica has four pizzas.
She gives each person $\frac{2}{5}$ of a pizza.
How many will four pizzas feed?
- c Make up word stories for these and then find the answers.
- i $6 \div \frac{2}{3}$ ii $9 \div \frac{3}{4}$ iii $6 \div \frac{2}{5}$ iv $16 \div \frac{4}{5}$

I want to know how many people the six pizzas will feed. If I have six pizzas that's 24 quarters altogether. So if each person has 3 quarters



40 Dividing a whole number into parts

We are learning how many times a unit fraction goes into a whole number.



Scissors, paper, strips of paper.

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Number Mats and
Number Fans
Fraction Pieces
Non-unit Fractions
Packets of Lollies
Bowl a Fact

In this book

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numbers to 100page 233
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Activity

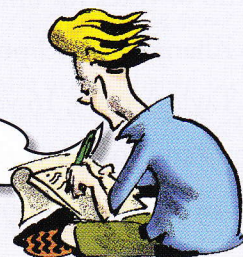


- 1 Sam has some licorice supertwists.
Cut a strip of paper about 20 cm long and pretend it is a licorice supertwist.

- a Cut your licorice supertwist into halves.
How many pieces do you have?

- b $1 \text{ licorice supertwist} \div \frac{1}{2} = 2$
The 2 is 2 pieces, each half of a supertwist.

Is Sam correct? Explain your answer.

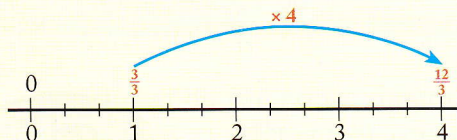


- c Write an equation like Sam's in **part b** to record your answers to these.
Explain what your answer is referring to.

- i Sam cut one supertwist into quarters. How many pieces did he get?
ii Sam cut one supertwist into thirds. How many pieces did he get?

Example Elise cut four muesli bars into thirds.
How many thirds did she have?

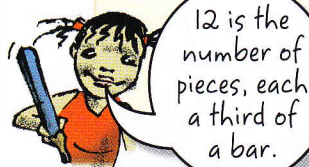
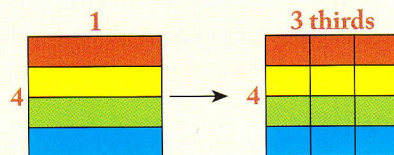
The number of thirds in four
can be written as $4 \div \frac{1}{3} = ?$



There are three thirds in each bar.
In four bars there will be
 $4 \times 3 \text{ thirds} = 12$

Using a double number line

or



$$4 \times 3 = 12$$

$$\text{so } 4 \div \frac{1}{3} = 12$$

Using arrays